

Study on National HR Competitiveness Assessment: Current Trends and Future Directions¹⁾

Oh, Hunseok²⁾ Shim, Han-Sik ³⁾ Choi, Jiyoung⁴⁾
Choi, Yoonmi⁵⁾ Park, Hyun-Jeong⁶⁾

Korea Human Resource Research Center, Seoul National University

ABSTRACT

This study attempts to develop a set of indicators to assess human resource competitiveness. To meet this purpose, the current status of the national competitiveness assessment model as well as its development process was reviewed. Also, by extracting indicators related to human resources from the national competitiveness assessment model, the strengths and weaknesses of the assessment method of national and HR competitiveness were analyzed. HR related theories were critically reviewed, and the implication of each theory was suggested. Based on these analyses, a HR competitiveness assessment model and indicators were developed.

Key words: human resources, human resources competitiveness, education competitiveness, competitiveness assessment, national creativity

-
- 1) This work was financially supported by a grant (KRF-2005-005-J16701) from the Korea Research Foundation.
 - 2) Contact E-mail : ohhs@snu.ac.kr
 - 3) Contact E-mail : hojin@snu.ac.kr
 - 4) Contact E-mail : choi0122@snu.ac.kr
 - 5) Contact E-mail : ymchoi03@snu.ac.kr
 - 6) Contact E-mail : hjp@snu.ac.kr

I. Introduction

In a knowledge-driven society where human resources and knowledge presumably produce more social and economic value than any other resource such as capital and land (Drucker 1993; Moon 2000; Park 2001), national competitiveness has become more dependent upon the quality of human resources. Most advanced countries have invested in developing key talent and upgrading workforce skills to prepare for the global market's limitless competition. Since the age of labor-intensive industry reached its terminus, a country's level of knowledge and technology determines its development. Development of human resources is of vital importance for each country, and their competitiveness becomes the key issue in enhancing national competitiveness.

So how do we know if a nation's human resources are powerful and competitive? To answer to this question, we need to glean ideas from evaluation models of education or human resource development because the models provide us with factors we should consider when we try to understand learners and human resources with holistic perspectives. The models also supply us with frameworks for us to see how current human resources have been created. Several prominent scholars proposed some new and differing models to assess competitiveness. Examples of these evaluation models are: Kirkpatrick's 4-Level Model (Kirkpatrick 1998), CIPP (Context, Input, Process, and Product) model (Stufflebeam 1971, 2003), TVS (Training Validation System) model (Fitz-Enz, 1994), and IPO (Input, Process, Output and Outcome) model (Bushnell, 1990).

These models provide useful tools in evaluating educational activities, and they try to view educational activities from various angles including educational outcomes. In addition to these models, widely recognized national competitiveness assessment reports such as IMD World Competitiveness Yearbook (IMD, since 1989), WEF Global Competitiveness Report (WEF,

since 1979), and IPS National Competitiveness Research Report (IPS, since 2001) also provide information about a country's HR competitiveness. Almost all the HR related indicators in these reports, however, are comprised of input factors only. So they have limitations in assessing the competitiveness of human resources, because they omit context, process, output, and outcome factors. This is resulted from the fact that their basic purpose of international comparisons was not to elaborately assess competitiveness of human resources but to evaluate the competitiveness of a nation as a whole, thus they include numerous factors besides human resources and exclude such human resource factors like process, output and outcome factors. Their indicators are not focused on education, and their measures are collected and combined using current education, training, and other human resource related measures.

Concerns that the education system cannot adequately prepare students for life and work in the 21st century have prompted people across the country to explore new ways of designing education. Since high quality education and human resources are the basis for maximizing national competitiveness (Moon 2000; Park 2001), educators and policy makers are attempting to change the way competitiveness of human resources is measured, from an emphasis on traditional inputs, such as course credits earned and hours spent in class, to results or outcomes.

This study aims at analyzing the existing national competitiveness assessment method and compares and contrasts its strengths and weaknesses, and suggests a model to assess competitiveness of human resources. To fulfill this research purpose, (1) the strengths and weaknesses of the existing national competitiveness assessment model were reviewed, and (2) a new model and indicators to assess competitiveness of human resources were suggested.

II. Research Method

A. Literature Review

In order to draw out HR related indicators from existing national competitiveness assessment models and to identify a HR competitiveness assessment method, IMD World Competitiveness Yearbook (IMD, since 1989), WEF Global Competitiveness Report (WEF, since 1979), IPS National Competitiveness Research Report (IPS, since 2001), and other related documents were closely reviewed. Theories and research articles on creativity were also analyzed. Models of assessing competitiveness were critically studied as well.

B. Expert Focus Group Interviews

As for the first expert focus group interview, HR experts in academia and government service brainstormed in order to get ideas about a HR competitiveness assessment model and indicators. Conceptual components and indicators were derived from this process.

In order to secure the face and content validity of the HR competitiveness assessment model and indicators, the second expert focus group interview was conducted with six experts in such fields as human resource development, educational psychology, educational technology, adult education, and educational measurement and statistics.

III. Approaches to the Assessment of HR Competitiveness

The first research question was to review some of the strengths and weaknesses of the existing national competitiveness assessment model. To explore them, outcomes of education, intellectual capital approach, and the three existing national competitiveness assessment models were reviewed.

A. Ideas from Evaluation Models

Examples of education output are reaction, learning, behavior, and results as suggested in Kirkpatrick's 4-Level Model (Kirkpatrick,1998). Kirkpatrick's model is categorized as a goal-based approach in that it is directly focused on educational output. On the other hand, the system-based approach of the CIPP model, TVS model, and IPO model takes input, process and output factors into consideration in assessing program evaluation. The CIPP (Context, Input, Process, and Product) evaluation model focuses on program evaluation, particularly those aimed at affecting long-term, sustainable improvements (Stufflebeam, 1971, 2003). Fitz-Enz's (1994) TVS (Training Validation System) model deals with situation, intervention, impact, and value in assessing the effectiveness of a program. The IPO (Input, Process, Output and Output) model of Bushnell (1990) extends the scopeto outcomes of long-term results.

Scriven (1972), working to move evaluators beyond the rote application of objectives-based evaluation, proposed a goal-free evaluation, urging evaluators to examine the processes and context of the program in order to find unintended outcomes. Stake (1975) proposed responsive evaluation, moving evaluators away from the dominance of the experimental and social science paradigms. Guba and Lincoln (1981), building on Stake's qualitative work, proposed naturalistic evaluation, leading to much debate over the relative merits of qualitative and quantitative methods.

This study attempts to evaluate HR competitiveness on a national level, but the models mentioned above were developed in the context of individual school programs, and therefore limitations exist in applying these models to HR related issues on the national level.

B. Intellectual Capital Approach

Rapid technological advances in information and communication technologies are transforming the nature of

knowledge, skills, talent, and know-how of individuals in the workplace. Today's global information marketplace requires a different kind of worker, one with competencies, attitudes, and an intellectual ability conducive to systemic and critical thinking within a technologically-oriented environment.

Intellectual capital of a nation requires the articulation of a system of variables that helps to uncover and manage the invisible wealth of a country. Machlup (1962) coined the term "intellectual capital" and used it to emphasize the importance of general knowledge as essential to growth and development. Alfred Marshall says "knowledge is our most powerful engine of production; it enables us to subdue nature and satisfy our wants"(World Bank, 1998: 20).

The concept of intellectual capital was further expounded on by management guru Drucker (1993) in his description of post-capitalist society. He highlighted the importance and arrival of a society that is dominated by knowledge resources and a competitive landscape of intellectual capital allocation. By the end of the 1990s, references to intellectual capital in contemporary business publications were commonplace (see Bontis 1996, 1998, 1999).

Much of the current academic literature on intellectual capital theory and its accompanying frameworks, constructs and measures stem from an accounting the financial perspective, focusing on the firm level of analysis (Bontis et al. 1999, 2000, 2002). Theorists soon extrapolated the initial conceptual level to also include nations. Malhotra (2001) argued that leaders of national economies are trying to find reliable ways to measure knowledge assets to understand how they relate to future performance. The expectation for finding reliable measures of knowledge assets are that such measures can help governments better manage the intangible resources that increasingly determine the success of their economies. The key to determining these success factors is an understanding of relationships and

synergistic modulations that can augment the value of each sub-component of intellectual capital (Choo & Bontis, 2002). Approaching economic development from a knowledge perspective that is, adopting policies to increase a nation's intellectual wealth can improve people's lives in a myriad of ways besides higher incomes (World Bank 1998).

The intellectual capital of a nation includes the hidden values of individuals, enterprises, institutions, communities, and regions that are the current and potential sources for wealth creation. These hidden values are the roots for nourishment and the cultivation of future wellbeing. For this purpose, it is essential to have a mapping system to describe the intellectual capital of nations and to systematically account and follow the evolution of such intellectual capital development.

Intellectual capital, an engine of national development, is comprised of three factors: human capital, social capital, and structural capital. The three capitals are the potentials that would produce intellectual capital. If the potentials are to be realized, human resources of a nation have to utilize the three capitals and produce intellectual capitals. In other words, intellectual capitals are the results of utilizing activities of the potential capitals by human resources. Hence, the assessment result of intellectual capital can be viewed as the competitiveness of human resources. With regard to this, this study addresses the current status and problems of indicators that assess HR competitiveness and explores future directions for developing HR competitiveness assessment indicators.

C. Current Status of HR Competitiveness Assessment

1. IMD World Competitiveness Yearbook

The World Competitiveness Yearbook, published by the International Institute for Management Development (IMD), is the most widely cited comprehensive annual report on the competitiveness of nations and was first published in 1989. The IMD is an international business school located in Switzerland

with ties to the world's leading business organizations. The IMD World Competitiveness Yearbook measures the ability of national economies to attract and retain investment through the creation of a globally competitive business environment.

An index of competitiveness for nations is constructed from various criteria. Indicators include gross domestic product (GDP), GDP per capita, number of patents in force, and public expenditure on education. Two thirds of the data are obtained from official national and international statistical sources and the other third by a survey of top executives and middle managers in the countries covered by the report.

The IMD World Competitiveness Yearbook features sixty-one national and regional economies as well as overall ranking, rankings by population size, rankings by peer group, and regional rankings. It also includes 312 different criteria, grouped into four competitiveness factors. Hard data are taken from international and regional organizations and private institutes, and survey data are drawn from the executive opinion surveys (4,055 respondents). It aggregates data over a 5-year period and ensures accuracy through collaboration with fifty-eight partner institutes worldwide.

The IMD World Competitiveness Yearbook provides several customized rankings by size, by wealth, by regions, and others. The overall competitiveness scoreboard is calculated by combining four competitiveness factors: economic performance, government efficiency, business efficiency, and infrastructure. It presents the overall ranking for the sixty-one countries and regional economies covered by the World Competitiveness Yearbook. The economies are ranked from the most to the least competitive, and performance can be analyzed on the basis of time-series. Korea ranked 38th in 2006, 29th in 2005, 35th in 2004, 37th in 2003, and 29th in 2002.

Education and HR related indicators in the IMD World

Competitiveness Yearbook are found in <Table 1>.

1 Total public expenditure on education.	21 Total R&D personnel nationwide per capita
2 Pupil-teacher ratio (primary education)	22 Total R&D personnel in business enterprise
3 Pupil-teacher ratio (secondary education)	23 Total R&D personnel in business per capita
4 Secondary school enrollment	24 Science degrees
5 Higher education achievement	25 Science in schools
6 Educational assessment	26 Youth interest in science
7 Educational system	27 Nobel prizes
8 University education	28 Nobel prizes per capita
9 Illiteracy	29 Human development index
10 Economic literacy	30 Health problems (AIDS, alcohol, drug abuse, etc.)
11 Education in finance	31 Quality of life
12 Language skills	32 Employee training
13 Qualified engineers	33 Female labor force
14 Knowledge transfer	34 Foreign labor force
15 Total expenditure on R&D (US\$ millions)	35 Skilled labor
16 Total expenditure on R&D (per capita)	36 Brain drain
17 Total expenditure on R&D (% of GDP)	37 Competent senior manager
18 Business expenditure on R&D	38 Females in parliament
19 Business expenditure on R&D per capita	39 Female positions
20 Total R&D personnel nationwide	40 Youth unemployment

<Table 1> Education and HR related indicators in the IMD World Competitiveness Yearbook

These indicators can be categorized in terms of input, process, and output factors. In the IMD World Competitiveness Yearbook, there are twenty-seven input factors, one process factor, and twelve output factors.

2. WEF Global Competitiveness Report

Through its reports and activities, the Global Competitiveness Network of the World Economic Forum identifies impediments to growth and thereby helps stimulate the development of relevant strategies to achieve sustained economic progress. The Global Competitiveness Network's flagship publication is the Global Competitiveness Report. It is the most comprehensive and authoritative assessment of the comparative strengths and weaknesses of national economies, used by governments, academics, and business leaders. The Global Competitiveness Report was first published in 1979, and its coverage has expanded each year since, now extending to 117 major and emerging economies.

The WEF ranks countries according to their ability to maintain sustained economic growth. The WEF's competitive index is constructed to extrapolate a country's economic growth potential over the long term. The broad categories of criteria analyzed by the WEF to construct the competitive index are openness, government, finance, infrastructure, technology, management, labor, and institutions. The methodology combines quantitative economic data with an executive opinion survey of over 3,000 leading business executives from nearly all of the countries evaluated. The report is a monumental undertaking, and it has become more refined over the years.

The Global Competitiveness Report team works with leading academics worldwide to ensure the latest thinking, and research on global competitiveness is incorporated into its reports. The report is unique in that the methodology combines publicly available data with survey data that captures the perceptions and observations of business leaders in a given country. The 2004–2005 report was based on a survey of 11,000 business leaders and the WEF members in 117 economies worldwide.

One fourth of the data are obtained from official national and international statistical sources and three fourths by a survey

of top executives and middle managers in the countries covered by the report. Like the IMD World Competitiveness Yearbook, since the portion of soft data surpasses hard data, the reliability of the assessment results can be misleading. Korea ranked 24th in 2006, 19th in 2005, 29th in 2004, 18th in 2003, and 21st in 2002.

Education and HR related indicators in the WEF Global Competitiveness Report are found in <Table 2>.

1	Secondary enrolment ratio	12	Internet users
2	Tertiary enrolment ratio	13	Personal computers Quality of scientific research institutions
3	Quality of the educational system	14	Company spending on research and development
4	Quality of math and science education	15	University/industry research collaboration
5	Quality of management schools	16	Government procurement of advanced technology products
6	Local availability of specialized research and training services	17	Availability of scientists and engineers
7	Extent of staff training	18	Utility patents
8	Cooperation in labor-employer relations	19	Intellectual property protection
9	Reliance on professional management	20	Capacity for innovation
10	Brain drain		
11	Private sector employment of women		

<Table 2> Education and HR-related indicators in the WEF Global Competitiveness Report

These indicators can be categorized in terms of input, process, and output factors. In the WEF Global Competitiveness Report, there are eighteen input factors and two output factors, but the process factor does not exist.

3. IPS National Competitiveness Research Report

The Institute for Industrial Policy Studies (IPS) and the Institute for Policy & Strategy on National Competitiveness (IPS-NaC) have been publishing the IPS National Competitiveness Research Report since 2001 using new assessment methods. The report distinguishes itself from other assessment methods by utilizing a methodology applicable to all nations, instead of focusing on unbalanced techniques that favor industrial countries, thereby improving theoretical and methodological problems encountered by previous competitiveness reports.

The IPS National Competitiveness Research 2006 Report utilized the newest 137 hard data and 138 survey data to assess the national competitiveness of sixty-six countries. The survey data were collected from sixty-six countries through 105 worldwide Korea trade centers of the Korea Trade-Investment Promotion Agency (KOTRA), and hard data were extracted from government and international organization resources worldwide, such as International Financial Statistics (IFS), World Development Indicators (WDI), and so forth.

Extended from Michael Porter's (1990) Diamond Model, the DDD (Dual Double Diamond) model is applied as the analytical tool to determine national competitiveness rankings. The DDD model is comprised of two factors: physical factors and human factors. Physical factors are a combination of factor conditions, demand conditions, related and supporting industries, and business context. Human factors consist of workers, politicians and bureaucrats, entrepreneurs, and professionals. These eight factors are further classified into twenty-three sub-factors and consequently into 275 criteria. Of the 275 criteria, sixty-three items are background information that is not included

in the calculation of national competitiveness but used for informative purposes only.

The IPS National Competitiveness Research Report serves an important role in that the sources of national competitiveness are more comprehensive. The Dual Double Diamond model incorporates human factors. They are, however, all economically productive population other potential population is excluded. The model considers both physical and human factors in both domestic and international contexts, and consequently, is expected to suggest a more rigorous explanation for national competitiveness than other existing models. Korea remained at 22nd in 2005.

Education and HR related indicators in the IPS National Competitiveness Research Report are found in <Table 3>.

1	Personal computers	18	Entrepreneur's international experience
2	Internet hosts	19	Entrepreneur's competitiveness
3	Internet user	20	Availability of entrepreneurs
4	Public spending on education	21	Leaders of society
5	Educational system	22	Professional's educational level
6	Student-teacher ratio (primary & secondary school)	23	Professional manager's international experience
7	Scientists and engineers	24	Professional's international experience
8	Total expenditure on R&D	25	Professional manager's core competence
9	Government expenditure on R&D	26	Professional's competitiveness
10	Business expenditure on R&D	27	Availability of professionals
11	Human development index	28	Professional manager's compensation

12	Innovativeness and creativity	29	Professional's pride
13	Labor force	30	Professional job's openness
14	Employment rate	31	Leaders of society
15	Literacy rate	32	Competitiveness
16	Entrepreneur's core competences	33	Potential
17	Entrepreneur's education level		

<Table 3> Education and HR-related indicators in the IPS National Competitiveness Research Report

These indicators can be categorized in terms of input, process, and output factors. In the IPS National Competitiveness Research Report, all the factors are inputs, and none are output or process factors.

4. Problems in Assessing HR Competitiveness

So far, national competitiveness assessment reports have been examined to see how human resource competitiveness is measured. Currently, the annual reports of national competitiveness assessment are the major and unique sources in assessing competitiveness of human resources. HR related indicators are, however, good for only a small portion, so that this leads to the possibility that HR competitiveness is not properly evaluated, and therefore, the interpretation of the results is distorted.

There are three additional problems in assessing HR competitiveness using national competitiveness assessment reports. First, there is no definition of HR competitiveness, nor do models of HR competitiveness assessment exist. There are various definitions of human resources in Table 4 (Oh, 2002), but no definition on HR competitiveness exists. Therefore, defining HR competitiveness should be preceded, and a model of HR competitiveness and its indicators need to be built up. Also, the model needs to be empirically tested.

Researcher	Definition
MOE ⁷⁾ (2000)	Valuable ability and character for the development of nation and society, and quality improvement of a nation
Kim (2000)	Stock of knowledge and skills which produce economic value
OECD (2001)	Knowledge, skill and ability, and attribute which create individual, social, and economic welfare
Park (2001)	Knowledge, information, skill and ability, experience and wisdom embedded in individuals
Committee of Education & HR Policy (2001)	Ability and attitude which develop quality of one's life, society and nation, such as human capital and social capital
Kim (2001)	Ability and attitude such as technology, information, and morality for the development of individual life quality, society, and nation
Jung (2001)	Capacity/competency of human factors such as knowledge, skill, and attitude
MOE (2002)	A person who possesses knowledge, skill and morality, experience, and wisdom
Law of HRD (2002)	Knowledge, skill, and attitude for the development of individual life quality, society, and nation

<Table 4> Definitions of Human Resources

Second, national competitiveness assessment reports mainly deal with input indicators, and process and output indicators are relatively overlooked. This is presented in <Table 5>.

HR Competitiveness Related Reports	Input	Process	Output
IMD World Competitiveness Yearbook (2006)	27	1	12
WEF Global Competitiveness Report (2006)	18	0	2
IPS National Competitiveness Research Report (2006)	33	0	0

<Table 5> Number of input, process, and output indicators among HR competitiveness related indicators

7) *MOE: Ministry of Education and Human Resources Development, Korea

Third, as for the survey data, they are obtained from official national and international statistical sources and also from top executives and middle managers in the countries. Also, the questions are rather close to an entrepreneur's satisfaction level toward education and human resources, so that it hurts the reliability and objectivity of the assessment results.

IV. Development of a New Model of HR Competitiveness Assessment

The importance of human resources is emphasized more than ever before, and human capital is regarded as the core of intellectual capital. In any case, human resources are the engine of a nation's development, and national competitiveness becomes more dependent upon the quality of human resources. Therefore, this study attempts to develop a model to assess competitiveness of human resources in an overall and comprehensive way, and this next section explains the method and process used to develop the model and indicators to assess competitiveness of human resources.

A. Framework of HR Competitiveness Assessment Model

Competitiveness of human resources is determined by their quantity and quality. The more human resources that there are, and the more qualified the human resources are, the higher a nation's HR competitiveness is. Also, human resources are defined as human and knowledge factors. Human factors indicate the characteristics of people themselves, and knowledge factors mean knowledge assets produced by people. Human resources are classified into two categories: current competitiveness and potential competitiveness. The former indicates people who currently take part in economic activities, and the latter indicates people who will serve in the future.

This study defines HR competitiveness as the quantitative size and the qualitative level of human resources who produce

social, economic, and culture values in one nation. Quantitative size, qualitative level, and the combination of these are the major criteria to assess the HR competitiveness level. A high level of HR competitiveness means that the quantitative size and qualitative level are balanced and harmonized.

Still, no matter how high the HR competitiveness is, it is useless if it is not developed, utilized, and managed. Quantity and quality of human resources is decided by what they learned (development), how they are employed and distributed (utilization), and how they are selected and circulated (management). Based on the discussion so far, the model of HR competitiveness is organized as follows.

B. HR Competitiveness Assessment Model

Figure 1 suggests the calculation method of HR competitiveness, and Table 6 shows a new model of HR competitiveness assessment.

$\text{HR Competitiveness Index} = \text{H Index} + \text{K Index} + \text{D Index}$ <p>(H: Human Factor, K: Knowledge Factor, D: Determinant Factor)</p>

<Figure 1> Calculation Method of HR Competitiveness

As suggested in Table 6, the HR competitiveness assessment model is composed of twenty-six human factors, twenty-one knowledge factors (national creativity index), and thirty-eight determinant factors (21 development indicators, 11 utilization indicators, and 7 management indicators).

Factors		Indicators	
A s s e s s m e n t F a c t o r s	H u m a n F a c t o r s	Quantity of General HR	·# of labor force of 25-64 years ·average working hours per week ·# of days of working days ·average monthly wage
		Quality of General HR	·average years of schooling ·average score of IALS ·total converted score of World Skills Competition ·working mind ·commitment to one's work ·EQ ·international personal contact rate ·healthy life expectancy
		Quantity of Professional HR	·# of holders of masters degree per a million population ·# of holders of doctorates per a million population
		Quality of Professional HR	·quality of professionals of each field in Korean Standard Classification of Occupation - competency of science professionals - competency of computer professionals - competency of engineering professionals - competency of law and social service professionals - competency of culture/art/broadcasting professionals ·competitiveness of bureaucrats ·competitiveness of national assembly member ·competitiveness of entrepreneurs ·total entrepreneurship activity ·availability of skilled workforce

K n o w l e d g e F a c t o r s ~ N a t i o n a l C r e a t i v i t y I n d e x			·corruption perceptions index
	Human Resources with Creativity	Creative Talent	·% of labor force in creative works (% of scientists, engineers, artists, entrepreneurs, professionals, technicians) · of labor force in high tech (6Ts) among total labor force
	Support Environment of Creativity	Diversity	·# of foreign residents in Korea per 10,000 population · of occupations in Korean Standard Classification of Occupation
		Tolerance	major change from bachelor and master to doctor
		Investment in R&D	·government's R&D expenditure as percents of GDP ·firm's R&D expenditure as percents of GDP ·R&D intensity (R&D expenditure as percents of GDP)
		Protection of Intellectual Property Rights	·# of protection laws of intellectual property rights ·score of public attitude toward software IPRs ·score of public attitude toward plagiarism
	Knowledge as a Result of Creativity	Intellectual Property Rights	·# of patents per a million population ·# of registered marks per a million population
Knowledge Creation		·# of new books per a 10,000 population ·of Nobel or Field prize winners per a million people ·average number of published articles by a professor per a year ·average number of published SSCI or SCI articles by a professor per a year	

D e t e r m i n a n t D e v e l o p m e n t F a c t o r s		Formal Education	<ul style="list-style-type: none"> ·duration(years) of compulsory education · of students participating in vocational education and industry-academia collaboration programs per a million people ·teachers' average years of education · of masters degree and doctorate holders among total teachers ·teacher's working condition ·number of students per teacher ·educational expenditure as percents of GDP or educational expenditure per a student ·% of primary and secondary school attendance ·mean score of PISA math or mean score TIMMS ·high school enrollment rate ·quality satisfaction of higher education · of school-aged population among total population ·variational trend of school-aged population
		Nonformal Education	<ul style="list-style-type: none"> ·flexibility of educational system: percentage of aged students(35+) enrolled in formal higher education ·government's expenditure on lifelong education as percents of GDP ·% of nonformal education participants with external financial aid resources among total participants ·rate of nonformal education participation
		Informal Education	<ul style="list-style-type: none"> · of informal education participants with external financial aid resources among total participants ·rate of informal education participation ·average number of books read per a person in a year or percentage of book reading people among total population

U t i l i z a t i o n	Employment and Distribution	<ul style="list-style-type: none"> ·number of library visitors in a year ·employment to population ratio ·average time consumed for first employment after graduation ·employment protection index ·workers' recognized level of unstable employment ·average tenure(years) in a same industry ·labor compensation rate
	Working Condition	<ul style="list-style-type: none"> ·regular workers to totally employment ratio ·stress level at workplace ·union organization rate ·frequency rate of industrial accidents ·level of knowledge workers average wage to total average wage
M a n a g e m e n t	Selection	<ul style="list-style-type: none"> ·recognition of promotion opportunities ·ratio of professional management ·gender empowerment index
	Mobility	<ul style="list-style-type: none"> · of employment security offices per 10,000 population ·average time for mobility ·career mobility rate ·brain drain index

<Table 6> HR Competitiveness Assessment Model

HR competitiveness refers to a nation's quantitative size and qualitative standard of human resources which creates social, economic, and cultural values. Assessment factors are direct targets of national HR competitiveness. HR competitiveness as assessment factors is comprised of the quantity of HR and the quality of knowledge, skills, and attitude of HR. The quantity of HR decides the potential that a nation can pursue a certain type of economy. For example, China and India can pursue low labor cost economy with their large labor forces, which Luxemburg cannot pursue. The quality of HR decides the level of an economy. Luxemburg can establish strong financial market

economy with their professional human resources of financial specialists although their quantity of HR is small, which China and India cannot because of its relatively low quality of financing professionals. Knowledge produced by HR is included in knowledge factors, which is called national creativity index.

Human resources of a nation can be categorized into general HR and professional HR. The general human resources are the labor force that holds energy and knowledge to utilizes financial and physical resources of a nation and to produce goods and services. The professional human resources are the people who have professional knowledge and leadership. They utilize and create advanced skills and technologies in their professional areas such as science, engineering, government, politics, and business. Their knowledge and decision making heavily influence on the prosperity of a nation because they set up new visions, strategy, and norms of a society.

HR competitiveness is assessed in terms of human and knowledge factors. Human factors can be assessed through both present and potential competitiveness. Present competitiveness of human resources indicates the population who is currently doing economic production, whereas potential human resources are those who will create values in the near future. For example, students attending middle and high schools are typical potential human resources. The knowledge factor is assessed through national creativity.

In the present study, the national creativity concept consists of three components: creativity talent, supportive environment of creativity, and knowledge as a result of creativity. First, the creative talent index measures the ratio of the labor force in creative occupations, which includes scientists, engineers, artists, entrepreneurs, professionals, and technicians. Second, the supportive environment of creativity is individual, psychological, cultural, financial, and institutional conditions enhancing creative thinking and the actions of a creative person. Once these

conditions are satisfied, creativity at a national level can be improved. It represents knowledge infrastructure such as investment in R&D. Third, knowledge as a result of creative thinking is related to the production of certified knowledge by an expert in the field. For example, a patent is a used indicator of creative knowledge. To be a more creative society, different kinds of knowledge as a result of creative thinking are required. Therefore, in the present study, three subcategories of the national creativity concept and measurable main indexes representing each subcategory are suggested.

Determinant factors are the ones that directly affect the determining quantity and quality of human resources. Quantity and quality of human resources are dependent upon how they are developed, utilized, and managed. Development of human resources implies the individual, social, and national activities that build up knowledge, skill, and attitude, creating socially useful values and accumulating them in individuals.

Therefore, the factors that affect the development of human resources are education and learning. OECD (2000) divides educational activities into formal, non-formal, and informal education. Formal education refers to education through a program of instruction at an educational institution, adult training center or in the workplace, which is generally recognized with a qualification or a certificate. Non-formal education refers to education through a program, but it is not usually evaluated and does not lead to a certification. Informal education refers to education resulting from daily work-related, family, or leisure activities.

Utilization of human resources means the process of creating values through one's knowledge, skills, and attitude. Merriam-Webster's Online Dictionary (2007) defines utilization as making use of something, or turning practical use or account. Human resources are the object of utilization, and human resources here indicate the current and static ones. Therefore,

utilization of human resources on a national level means one nation's effectively utilizing human resources. Indicators of HR utilization are the ones that reveal how well current human resources are utilized, and therefore wages and working conditions are included in the indicators of HR utilization.

Management of human resources in an organizational context indicates planning, organizing, and controlling activities that afford, maintain, develop, and use human resources. Management of human resources at the national level, therefore, refers to selection, shift, development, and utilization, because national human resource development includes all the human resources inside and outside organizations. More specifically, selection and shift of human resources are the two main activities of HR management. Continuing one's studies and the labor market are the indicators of HR selection. Migration, inter-industry mobility, occupational mobility, job mobility, inter-firm mobility, school-to-school, and work-to-school are indicators of shift of human resources.

V. Conclusion and Discussion

The purpose of the study was to develop an assessment model that reveals a nation's competitiveness level of human resources. To meet this purpose, HR related theories and national competitiveness assessment models were reviewed, and HR indicators which suit the framework of Korean human resources and at the same time, which enable international comparison, were selected and organized. The major characteristics of the model are that it is not a simple list of indicators; rather, it divides HR related indicators into assessment and determinant factors, and shows their systematic relationship. As a result, human factors and knowledge factors were included as assessment factors, and development, management and utilization of human resources were included in the determinant factors. That is this model overcame the limitation of previous models that had limitation that focused only on input factors of

human resources by embracing context (e.g., working conditions, educational conditions, and environment of creativeness), process (e.g., selection and mobility), output (e.g., knowledge creation) factors. If it is possible to collect real HR related data from all over the world and produce a HR competitiveness index, it would provide the strengths and weaknesses of human resources and HR policy of a nation, and enable us to do an international comparison based upon the holistic perspective that embraces context, process, input and output factors.

Still, there are a few things needed to validate the HR competitiveness assessment model. First, focus group interviews with experts in such fields as HRD, economy, business management, and education should be called to secure face validity. Second, the issues of weighting each indicator need to be fixed through FGI or Delphi techniques, since it is obvious that each indicator would not affect HR competitiveness equally. Based on this, once survey items are decided, pilot tests should be conducted and the model needs to be sophisticated.

One major significance of the study is that the knowledge factor is included in one of the components of human resources. Knowledge, which is based on creativity, is stressed in the model, and the study tried to develop a national creativity index. By critically reviewing the theoretical and assessment model of creativity in individual, organizational, social and national level, a concept of national creativity and some exemplary indicators were derived.

The issue of creativity is closely related to the fact that it is a knowledge-based society. In a knowledge-driven society, knowledge creation and utilization ability that produces national values are critical, and knowledge and information play critical roles in the process of production (Drucker, 1993; as cited in Oh, 2003). After all, creativity plays a central role in enabling such knowledge activities.

Since there are no specific measures to assess the level of national creativity, the development of national creativity indicators will give a clear idea to understanding the level of creativity in an objective and implicit manner. Moreover, the result will provide significant implications on policies to enhance national creativity.

References

- Bontis, N. (1996). There's a price on your head: Managing intellectual capital strategically. *Business Quarterly, Summer*, 40-47.
- Bontis, N. (1998). Intellectual capital: An exploratory study that develop measures and models. *Management Decision, 36*(2), 63-76.
- Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management, 18*(5-8), 433-462.
- Bontis, N., Chua, W., & Richardson, S. (2000). Intellectual capital and the nature of business in Malaysia. *Journal of Intellectual Capital, 1*(1), 85-100.
- Bontis, N., Crossan, M., & Hulland, J. (2002). Managing an organizational learning system by aligning stocks and flows. *Journal of Management Studies, 39*(4), 437-469.
- Bontis, N., Dragonetti, N., Jacobsen, K., & Roos, G. (1999). The knowledge toolbox: A review of the tools available to measure and manage intangible resources. *European Management Journal, 17*(4), 391-402.
- Bushnell, D. S. (1990). Input, process, output: A model for evaluating training. *Training and Development Journal, March*, 41-43.
- Choo, C. W., & Bontis, N. (2002). *The strategic management of intellectual capital and organizational knowledge*. NY: Oxford University Press.

- Drucker, P. (1993). *Post-capitalist society*. NY: Harper Collins.
- Fitz-Enz, J. (1994). *How to measure human resources management*. CA: McGraw-Hill.
- Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation*. CA: Jossey-Bass.
- IMD (Various years). *World competitiveness yearbook*. Lausanne: International Institute for Management Development.
- IPS (Various years). *IPS National competitiveness research report*. Seoul: Institute for Industrial Policy Studies.
- Kirkpatrick, D. L. (1998). *Evaluating training programs: The four levels*. MA: Berrett-Koehler Publishers.
- Machlup, F. (1962). *The production and distribution of knowledge in the United States*. NJ: Princeton University Press.
- Malhotra, Y. (2001). Knowledge assets in the global economy: Assessment of national intellectual capital. In Y. Malhotra (Ed.), *Knowledge management and business model innovation*. London: Idea Publishing Group.
- Merriam-Webster's Online Dictionary* (2007). <http://www.m-w.com/cgi-bin/dictionary>. Search on September 14, 2007.
- Moon, Y. (2000). Education innovation and national competitiveness. *Proceedings of principal workshop 2000*. Seoul: National Special Education Institute.
- OECD (2000). *The contribution of community funds, initiatives and programmes to lifelong learning*. Birmingham: ECOTEC.
- Oh, H. (2002). Exploration of national HRD management model and directions for HR policy. *Asian Journal of Education*, 3(2), 191-218.
- Oh, H. (2003). Understanding of national human resource development. In A. Kim (Ed.), *Education and human resource development*. Seoul: Korean Educational Development Institute.
- Park, S. (2001). Prospect of knowledge-economy for enhancing national competitiveness and HRD. *Proceedings of policy roundtable 2001*. Seoul: Education Innovation Forum.
- Porter, M. E. (1990). *The competitive advantage of nations*. London: Macmillan.

- Scriven, M. (1972). Pros and cons about goal-free evaluation. *Evaluation Comment*, 3, 1-7.
- Stake, R. E. (1975). *Program evaluation, particularly responsive evaluation* (Occasional Paper No. 5). MC: Western Michigan University Evaluation Center.
- Stufflebeam, D. L. (1971). The relevance of the CIPP evaluation model for educational accountability. *Journal of Research and Development in Education*, 5, 19-25.
- Stufflebeam, D. L. (2003). The CIPP model for evaluation. In T. Kellaghan, D. L. Stufflebeam, & L. A. Wingate (Eds.), *International handbook of educational evaluation*. MA: Kluwer Academic Publishers.
- WEF (Various years). *Global competitiveness report*. Geneva: World Economic Forum.
- World Bank (1998). *Knowledge for development*. DC: World Bank.